IRENE LI

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EDUCATION

Ph.D., Chemistry, Tufts University, Medford, MA. February 2008.
Thesis: Sum frequency studies of single crystal ice (Ih) as related to its lattice orientation.
Advisor: Dr. Mary Jane Shultz.

M.S., Industrial Chemistry, University of Central Florida, Orlando, FL. December 2000.
Thesis: Chemical-mechanical wear mechanism in polyurethane polishing pad materials.
Advisors: Dr. Kathleen Richardson (UCF, now at Clemson Univ.), Dr. Yaw Obeng (Lucent Technologies, now at NIST)

B.S., Chemistry, Minor in Secondary Language: French, University of Florida, Gainesville, FL. May 1998.

RESEARCH & WORK EXPERIENCE

Postdoctoral Fellow, Jet Propulsion Laboratory affiliate (University of California Los Angeles), Pasadena, CA, Advisor: Dr. Murthy Gudipati, 2008-present

- Conducted water-ice matrix studies under simulated planetary icy body conditions
- Spectroscopically analyzed (UV-Vis, IR) organically-doped ices for astrobiological studies
- Studied and modeled electron penetration interactions in doped ices by varying radiation and temperature
- Conducted conductivity and charge of ambient water doped with aromatic hydrocarbons to compare its behavior to its solid form

Research Assistant, Water and Surfaces Lab, Tufts University, Advisor: Dr. Mary Jane Shultz, 2000-2008

- Skilled in preparing single-crystal ice samples
- Aided design and construction of ice characterization techniques to select ice orientation
- Performed surface spectroscopy (Sum Frequency Generation) experiments on ice surfaces to determine and monitor reaction behavior of bonded OH on ice surface as a function of both temperature and orientation
- Initiated contact for collaboration with Dartmouth Ice Facility Group and Tufts Mechanical Engineering (Tufts University Future Technologies Lab)
- Performed time evolution studies at the interface of quartz and different aqueous solutions using SFG and atomic force microscopy

Research Assistant, Center for Research and Education in Optics and Lasers, University of Central Florida, Advisor: Dr. Kathleen Richardson, 1999-2000

- Formulated a slurry penetration model in commercial polyurethane-based polishing pads by differentiation of mechanical and solvent interaction effects
- Extrapolated polymer and environmental aging effects using a dynamic mechanical analyzer
- Lead for dynamic mechanical analysis work for Bell Labs (Orlando, FL) on a design of experiment encompassing two universities
- Reported quarterly and biannual results both in oral and written format to financial supporters (Center of Optical Manufacturing, Lucent Technologies)

Lucent Technologies Internship, Bell Laboratories, Orlando, FL, Advisor: Dr. Yaw Obeng,1999

- Resolved failure issues of integrated circuit thin films at a microstructural scale
- Performed nanoindentation and nanoscratch tests to characterize dynamic mechanical and adhesion properties of the films
- Maximized film performance by evaluating cracking toughness, material delamination and adhesion

Independent Undergraduate Senior Research, George and Josephine Butler Polymer Research Laboratory, University of Florida, Advisor: Dr. Randolph Duran, 1997–1998

- Synthesized novel monomers that were polymerized to form polyphenylene vinylene
- Skilled in chromatographic techniques to purify organic compounds
- Performed Langmuir-Blodgett techniques to study monolayer properties of compounds

Pilot Program for International Exchange Internship (Research Experience for Undergraduates), CNRS University of Lyon, France, Advisor: Dr. Règis Mercier,1997

- Synthesized novel diamine monomers
- Used purifying techniques (column chromatography, recrystallization) and verified purification results through NMR data interpretation
- Worked towards polymerizing novel diamine monomers

PUBLICATIONS

- Shultz, M.J.; Bisson, P.; Buch, V.; Groenzin, H.; **Li, I.**; "Aqueous hydrogen bonding probed with polarization and matrix isolation spectroscopy". *J Mol. Struct.* 2009, submitted.
- Groenzin, H.; **Li, I.**; Shultz, M.J.; "Sum-frequency generation: Polarization surface spectroscopy analysis of the vibrational surface modes on the basal face of ice I_h", *J. Chem. Phys.* 2008, 128, 214510.
- Buch, V.; Groenzin, H.; **Li, I.**; Shultz, M.J.; Tosatti, E.; "Proton order in the ice crystal surface", *PNAS*, 2008, 105 (16), 5969-5974.
- Groenzin, H.; **Li, I.**; Buch, V.; Shultz, M.J.; "The single-crystal, basal face of ice Ih investigated with sum frequency generation", *J. Chem. Phys.* 2007, 127, 214502-1 – 214502-8.
- Buch, V.; Tarbuck, T.; Richmond, G.L.; Groenzin, H.; **Li, I.**; Shultz, M.J.; "Sum frequency generation surface spectra of ice, water and acid solution investigated by an exciton model" *J. Chem. Phys.* 2007, 127, 204710-1 – 204710-15.
- Groenzin, H.; **Li, I.**; Shultz, M.J.; "Sum frequency generation on single-crystalline ice Ih" *Proceedings of the 11th International Conference on the Physics and Chemistry of Ice*, Bremerhaven, Germany 2007, Kuhs, W., ed., Royal Society of Chemistry, 191-199.
- **Li, I.**; Bandera, J.; Shultz, M. J.; "Time evolution studies of the H_2O/quartz interface using sum frequency generation (SFG), AFM, and molecular dynamics" *Langmuir* 2004, 20 (24) 10474-10480.
- Obeng, Y. S.; Ramsdell, J.; Machinsky, S.; Lu, H.; **Li, I.**; Forsthoefel, K. M.; Richardson, K.; Seal, S.; "Characterization of "in-process" degradation of polyurethane CMP pads" *Electrochem. Soc. Proc.* 2002, 2002-1(Chemical Mechanical Planarization V), 13-25.
- Ramsdell, J.; Seal, S.; **Li, I.**; Richardson, K.A.; Desai V.; Easter, W.G.; "Characterization of polyurethane pads used in CMP" *Electrochem. Soc. Proc.* 2000, 198th meeting, G1.
- Ramsdell, J.; Seal, S.; **Li, I.**; Richardson, K. A.; Desai, V.; Easter, W. G. "Surface characterization of polyurethane pads used in chemical mechanical polishing (CMP)" *Electrochem. Soc. Proc.* 2001, 2000-26 (Chemical Mechanical Planarization IV), 102-113.
- **Li, I.**; Forsthoefel, K.M.; Richardson, K.A.; Obeng, Y.S.; Easter, W.G.; Maury, A.; "Dynamic Mechanical Analysis (DMA) of CMP pad materials" *Mat. Res. Soc. Symp. Proc.* 2000, Vol 613, E7.3.1-E7.3.10.
- Batten, J.H.; **Li, I.**; Duran, R.S. "Toward the synthesis of a copper(II) ion sensing polymer" *Polym. Prepr.*, Am. Chem. Soc. Div. Polm. Chem. 1998, 39 (2) 542-3.

INSTRUMENTATION, SKILLS & PROGRAMS

Nd:YAG, Pulsed Laser System	Polarizing Microscope	Origin
Optical Alignment	Dynamic Mechanical Analyzer	Excel
Cryogenics	Nanoindentator	Spartan
Glassblowing	Shore Hardness Tester	LaTex
Atomic Force Microscopy	Column Chromatography	LabView
FT-IR Spectroscopy	Ultra High Vacuum Material Handling	
UV-Vis Spectroscopy	Electron Gun	

AWARDS & ACTIVITIES

Graduate Assistance in Areas of National Need (GAANN) Fellowship Recipient (2006-2007), organized Physical and Analytical Chemistry Journal Club (2004-2005), Tufts Chemistry Graduate Student Council representative and founding member (2001-2003), awarded outstanding graduate student organization (2003), small group discussion leader in the Harvard Graduate Student Christian Fellowship (2001-2005), Advanced Materials Processing and Analysis Center Graduate Research Fellowship Recipient (Spring-Summer 2000)